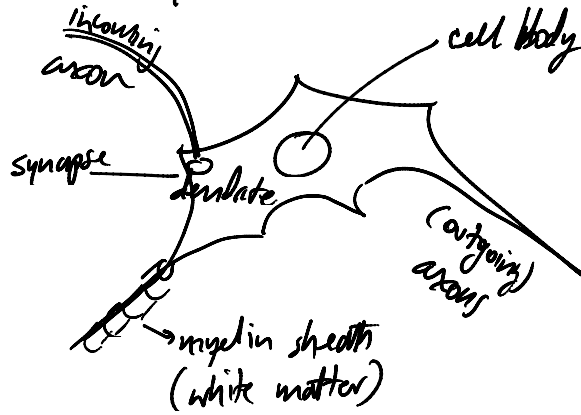


Last time...

- retina
- retinal cells: neurons
- typical neural cell:



- rods & cones: specific types of dendrites (which respond to incoming light)

- in retina: a lot of interconnections at/between levels

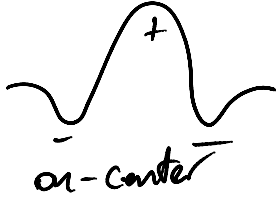
in fovea:

- each cell connected to about 6 cones } receptive fields are smaller

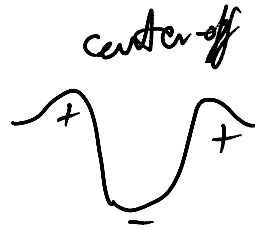
in periphery:

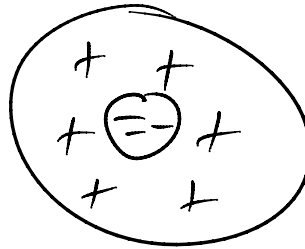
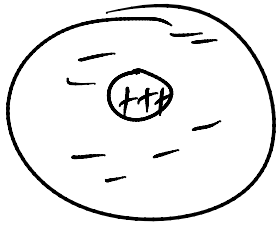
- each cell connected to about 30-40 cones

- 2 types of bipolar cells: "on" & "off" cells cr. light signal profile: "Mexican hat"

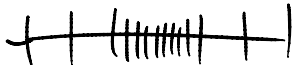


or

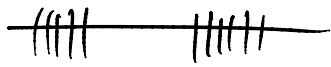




interconnections give rise to receptive fields



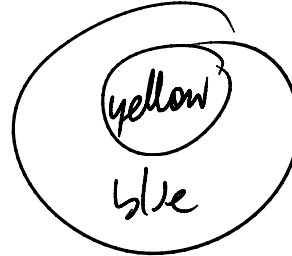
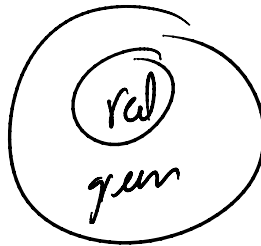
center illuminated



surround illuminated

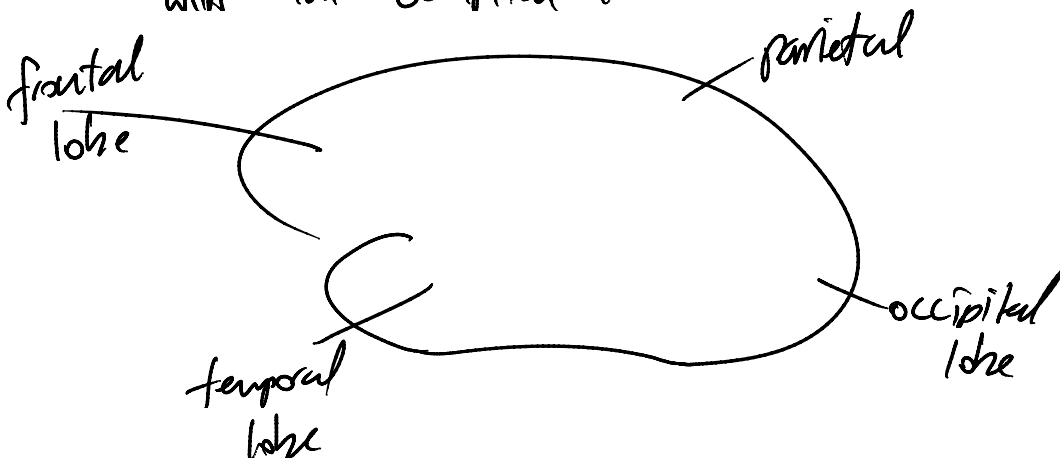
types of receptive fields:

- luminance (contrast enhancers)
- motion
- color (chrominance)

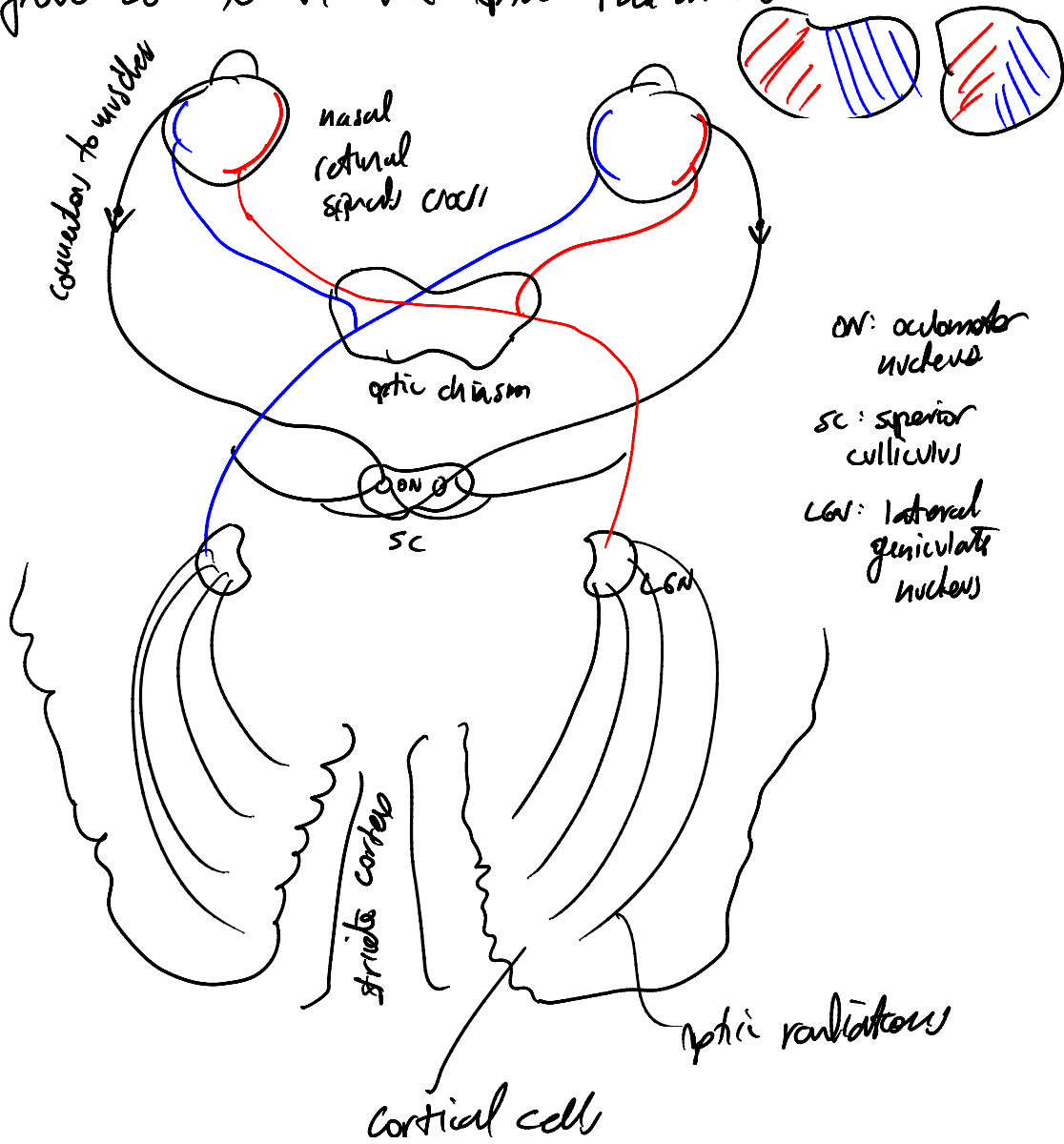


color opponency

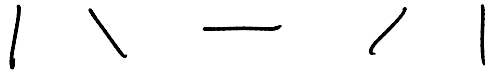
- where do signals go next?
 - from retinal ganglion
 - to Lateral geniculate nucleus (LGN)
(in the thalamus) — part of brain containing nuclei of thalamic field serving as relay stations (like the LGN)
- Thalamic axons from the M- and P-layers of the LGN — nerve out from LGN & terminate in area V1 of the striate cortex within the occipital lobe



- from LGN to V1 via optic radiation



- cortical cells: respond to orientation-specific stimuli — cells that "prefer" edges of different orientations

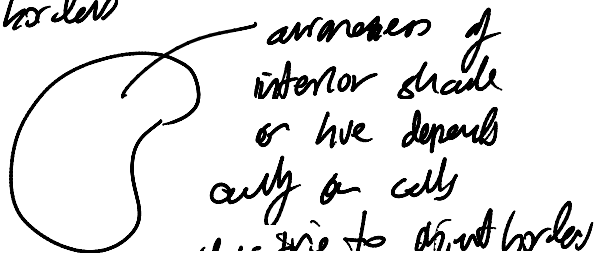


- directional selectivity (DS)
 - cortical directional selectivity (CDS):
 - contributes to motion perception & eye movements
 - retinal directional selectivity (RDS):
 - does not contribute to motion perception, but does to oculomotor response (eye movements)

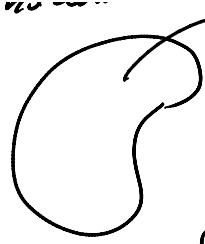
- significance of motion-sensitive single-cell physiology:

1. eye movements are never perfectly still
 - even while fixating we make tiny movements called microsaccades
 - perfectly stable visual field disappears
2. due to characteristics of these cells, there is no "retinal buffer" — representation of visual field is more abstract than intuition suggests

→ perception of objects mostly depends on its borders



... (1) ...



amount of
interior shade
or live depends
only on cells
sensitive to adjacent bodies

- implications: eyes are very important (homogeneous field, left or right)

- "where": M-layers: magno-cellular — peripheral

- "what": P-layers: parvo-cellular — foveal



are these pathways really distinct?

is there no crosstalk? Yes there is,

distinction is not that clear... (see Zeki)